CATATAN SINGKAT

Potency of freshwater fishes in Aceh waters as a basis for aquaculture development program

[Potensi ikan air tawar di Aceh sebagai dasar untuk pengembangan budi daya]

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Abstract

The development of aquaculture industry of Aceh Province should be based on local potency of indigenous species; however adequate information on the economic status of these freshwater fishes is crucially needed to support this activity. Hence, the objective of the present study was to evaluate the potency of the freshwater fishes which found in Aceh waters as a basic for aquaculture and conservation program. Explorative sampling was conducted from January 2008 to July 2012 in seventeen locations of Aceh Province. A total of 114 species of freshwater fishes were documented during the survey, of which 84 species were true freshwater fishes and the rest species were estuarine fishes. Among the freshwater fishes about 40were utilized for consumption, of these 14 species were of high economic value and they have potential as fish target for aquaculture, while at least 21 species displayed potential for the ornamental fish.

Keywords: aquaculture, ornamental fish, *Poropuntius, Rasbora, Tor.*

Abstrak

Pengembangan industri budi daya ikan di Provinsi Aceh perlu dilakukan dengan memberdayakan spesies lokal, namun demikian belum ada informasi yang akurat mengenai status ekonomi ikan-ikan air tawar yang memiliki nilai ekonomis tinggi dan berpotensi untuk dikembangkan sebagai ikan budi daya. Kajian ini bertujuan untuk mengevaluasi potensi ikan-ikan air tawar yang ada di Provinsi Aceh agar dapat dijadikan dasar dalam pemilihan spesies untuk dibudidayakan. Pengambilan contoh melalui eksplorasi dilakukan pada bulan Januari 2008 sampai bulan Juli 2012 di beberapa kawasan dalam Provinsi Aceh. Selama penelitian terkoleksi sebanyak 114spesies ikan, terdiri atas 84 spesies ikan air tawar dan sisanya adalah ikan payau.Diantara ikan air tawar tersebut, sebanyak 40 spesie smerupakan ikan konsumsi dan 14 spesies diantaranya bernilai ekonomis tinggi serta berpotensi untuk dibudidayakan, sementara 21 spesies ikan air tawar lainnya memiliki potensi sebagai ikan hias.

Kata penting: budi daya, ikan hias, *Poropuntius*, *Rasbora*, *Tor.*

Introduction

The Aceh Province has vast potential for fisheries as it has many rivers, marshes and lakes with numerous fish species with high economic value. However, these potential have not been optimally utilized. Recently, the aquaculture industry has become a popular business in Aceh Province, but unfortunately has been dominated by the culture of invasive species such as *Oreochromis niloticus, Clarias gariepinus*, and *Cyprinus carp*io (Muchlisin, 2012). General scientific consensus agrees that the introduction of alien species has negative impact on biodiversity and has become a global ecological problem, especially in inland water systems (Garcia-Berthou & Moreno-Amich, 2000) and fisheries production (Sorensen & Hoye, 2007). Introduction of exotic species is also a serious issue that contributes to depletion of native species (Leung *et al.*, 2006; Westphal*et al.*, 2008). Biological invasion is widely considered to be the second highest cause of species extinction after habitat destruction (Simberloff, 2003). A report on introduced freshwater fishes in Aceh waters and its problem has

been reported by Muchlisin (2012). However, it is likely that the total number of introduced fishes in Aceh waters is underestimated as many areas have not been surveyed and it is threatening the indigenous species. Most the exotic species in Aceh was introduced in purposes especially for species diversification in aquaculture industry.

In order to sustain development of the aquaculture industry in Aceh, aquaculture must be based on indigenous species. Therefore, information on the economic value and important species of the indigenous fishes is necessary as a basis for the selection of target species. Hence, this paper presents an initial evaluation on the important native species of freshwater fishes in Aceh waters based on their economic and conservation values.

Materials and methods

A series of explorative survey was conducted based on initial reports from local residents in seventeen locations around Aceh Province (Figure 1) during 2008 to 2012.

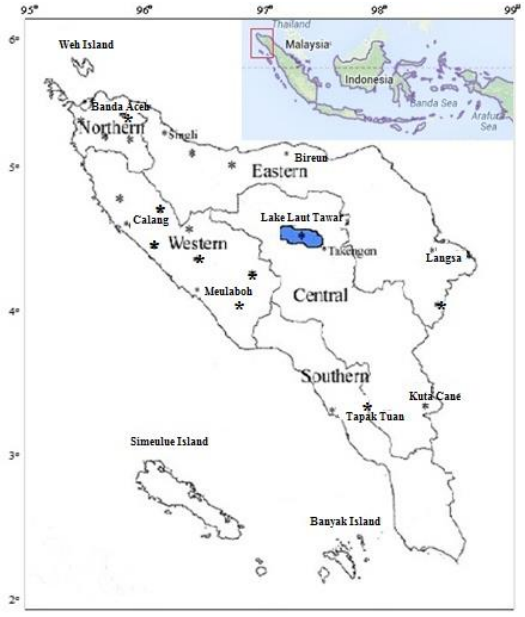

Figure 1. Regions of Aceh Province showing sampling sites (*) and main cities

Gillnet (mesh size of 0.75, 1, 2, and 3 inches), hooks, acting nets (mesh size of 1, 2, and 3 inches) and traditional traps (*bubu*) were used to catch the fish samples. The fishes were counted and sub samples for each species were cleaned and photographed, then preserved in 10% formalin and tagged with location, date, and local name of fishes. Fish larger than 15 cm were first injected with absolute formalin prior to preservation in 10% formalin ensuring the preservation of internal organs. The samples were transported to laboratory and identified based on protocol detailed in Kottelat *et al.* (1993). After identification, the samples were transferred into 70% ethanol for long-term preservation.

A fish was regarded as having economic value if it is valuable as a food item or as an ornamental or both. The former was further divided into three categories according to the average of local selling price. Based on the selling prices, the fishes were grouped into three categories of economic value as follows: Low (< US$ 1 kg^{-1}); Moderate (US$1 to US$ 2 kg^{-1}); High (> US$ 2 kg^{-1}). The potential value of ornamental fishes was classified according to colorization of scale and fins, morphology, pattern of fins and behaviors, but these measurements were more subjective evaluations.

Results

A total of 114 fish species were recorded during the survey, of these 84 species were categorized into true freshwater fishes where 40 species (47.62%) were considered as edible fish followed by 21 species (25%) as ornamental fish (Table 1). Among edible fish, 14 species (35%) were categorized as high priced (Table 2), 11 species (27.5%) as moderately priced (Table 3) and 15 species (37.5%) as low priced (Table 4).

In addition, among edible fishes, five species are introduced species i.e. *Ctenopharyngodon idella, Clarias gariepinus, Cyprinus carpio, Oreochromis mossambicus*, and *O. niloticus*. Moreover, two ornamental fishes are also the introduced species i.e. *Xiphophorus helleri* and *X. maculatus.*

Table 1. The freshwater fishes with potential as ornamental fish

No.	Scientific name	Local name	Common name
1.	*Anematichthys armatus*	merah mata	
2.	*Anematichthys apogon*	merah mata	beardless barb
3.	*Awaous* sp.	cung	-
4.	*Betta anabatiodes*	ikan laga	ginat betta
5.	*Betta fusca*	ikan laga	dusky betta
6.	*Butis amboinensis*	cung	olive flathead-gudgeon
7.	*Butis* sp.	cung	-
8.	*Glyptothorax platypogonides*	trop	-
9.	*Glyptothorax platypogon*	katel	-
10.	*Pterygoplichthys pardalis*	sapu kaca, indosiar	amazon sailfin catfish
11.	*Mystus bimaculatus*	suik	-
12.	*Ophiocara porocephala*	luntok	northern mud gudgeon
13.	*Osteochilus* sp.	serukan merah	-
14.	*Parioglossus* sp.	-	-
15.	*Poropuntius tawarensis*	kawan	-
16.	*Puntius lateristriga*	gempual	spanner barb
17.	*Puntius binotatus*	kepras	spotted barb
18.	*Trichopodus trichopterus*	sepat rawa	three spot gourami
19.	*Trichopodus pectoralis*	sepat siam	snakeskin gourami
20.	*Xiphophorus helleri*	buntok	green sword tail
21.	*Xiphophorus maculatus*	buntok merah	southern platyfish

Table 2. The freshwater fishes with high economic value for fish consumption

No.	Scientific name	Local name	Common name
1.	*Anguilla bicolor bicolor*	kirai	Indonesian short fin eel
2.	*Anguilla marmorata*	ileah, nijea	giant mottled eel
3.	*Channa striata*	bacei	striped snakehead
4.	*Channa lucius*	bujok	-
5.	*Clarias batrachus*	semu	walking catfish
6.	*Clarias teijsmanni*	sengko	-
7.	*Clarias niefhofii*	limbek	-
8.	*Ctenopharyngodon idella*	ikan cina	grass carp
9.	*Neolissochilus* sp.	jurong	green mahseer
10.	*Poropuntius tawarensis*	kawan	-
11.	*Rasbora tawarensis*	depik	-
12.	*Tor soro*	jurong	mahseer
13.	*Tor tambra*	jurong, kereling	mahseer
14.	*Tor tambroides*	kereling	mahseer

Table 3. The freshwater fishes with moderate economic value for fish consumption

No.	Scientific name	Local name	Common name
1.	*Anematichthys armatus*	merah mata	-
2.	*Anematichthys apogon*	merah mata	beardless barb
3.	*Clarias gariepinus*	dumbo	african catfish
4.	*Cyprinus carpio*	ikan mas	common carp
5.	*Hampala macrolepidota*	kebarai	hampala barb
6.	*Monopterus albus*	lineang	asian swamp eel
7.	*Osteochilus kahajenensis*	serukan	-
8.	*Osteochilus vittatus*	serukan	-
9.	*Osteochilus* sp.1	serukan	-
10.	*Osteochilus* sp.2	serukan	-
11.	*Oxyeleotris uropthalmus*	ketutu	marble goby

Table 4. The freshwater fishes with low economic value for fish consumption

No.	Scientific name	Local name	Common name
1.	*Anabas testudineus*	Kruep	Climber perch
2.	*Channa cyanospilos*	Jampak	Bluespotted snakehead
3.	*Kryptoterus minor*	Lepok/Lepik	Ghost catfish
4.	*Lebtobarbus hosii*	Gro	Hoven's carp
5.	*Hemibagrus nemurus*	Bahung	Asian bagrid catfish
6.	*Mystus negriceps*	Bahung	River catfish
7.	*Mystus gulio*	Suik	Long whiskers catfish
8.	*Mystus micracanthus*	Bahung	Twospot catfish
9.	*Oreochromis mossambicus*	Mujair	Mozambique tilapia
10.	*Oreochromis niloticus*	Nila	Nile tilapia
11.	*Pseudorhombus arsius*	Ikan sebelah	Large tooth flounder
12.	*Puntius binotatus*	Kepras	Spotted barb
13.	*Puntius brevis*	Gro	-
14.	*Trichopodus trichopterus*	Sepat rawa	Three spot gourami
15.	*Trichopodus pectoralis*	Sepat siam	Snakeskin gourami

Discussion

The evaluation revealed that out of 114 fish species, 84 species were true freshwater fishes, of these 40 species were determined to have economic value as edible fish, and 21 species have potency as ornamental fish. While the rest of the species had no observable economic values and they likely play important roles in maintaining the integrity and health of the river or lake ecosystems.

Among the highly valued species, the majority were Cyprinids (46.15%) and Clariids (23.08%). In particular, *keureling* or tambra (*Tor*) could fetch a high price of >US$ 30 kg^{-1}. According to Haryono & Subagja (2008), mahseer fish is the most popular due to this species reached 30 kg weight individually. Therefore, this fish is vigorously hunted including using destructive fishing equipment such as electrofishing and poison. Other species of economic importance include *Anematichthys armatus, A. apogon, Osteochilus* sp., *P. tawarensis, T. trichopterus* and *T. pectoralis* targeted as aquarium fishes as well as for food. Moreover, 21 species have potential as aquarium fishes, some of which are already established as popular ornamental fishes such as *X. helleri, X. maculatus,* two species of *Betta, T. trichopterus, T. pectoralis* and *H. pardalis,* while the other species could be introduced to hobbyists.

According to Gupta *et al.* (2005), 242 species of freshwater finfish are cultured worldwide and of these, Cyprinidae are the most dominant species, especially in Asia. In Indonesia, only ten indigenous cyprinid species are used in aquaculture i.e. *Barbonymus gonionatus, B. schwanenfeldii, Puntius orphoides, Osteochilus hasseltii, Leptobarbu shoevenii, Tor tambra, T. douronensis, T. tambroides* and *Thynnichthys thynnoides* (Emmawati *et al.* 2005). However, there are no indigenous cyprinids or clariids being commercially exploited in Aceh Province, just introduced species such as *C. gariepinus, O. Niloticus* and *C. carpio*. Thus, there is a lot of potential for Acehnese fish farmers to target higher valued indigenous species than introduced species in aquaculture for both consumption and aquarium purposes. Beside *P. tawarensis* and *R. tawarensis*, other candidates for aquaculture development program both consumption and ornamental purposes, for example within the genera *Tor, Neolissochilus, Clarias, Channa,* and *Anguilla* for fish consumption; while *P. tawarensis*, *B. anabatiodes, B. fusca, B. amboinensis, G. platypogoniodes*, *G. platypogon* for ornamental fishes. However, basic information on the biological and ecological aspects of candidate species

should be studied prior to any commercial program. Until now, very limited information on indigenous species of Indonesian freshwater fishes especially higher economic value were available. On the other hand the pressure on the freshwater ecosystem is continuing and threatening the native fish population. For example in Lake Laut Tawar, Aceh Province, there are two endemic freshwater fishes are occurred in this lake, unfortunately the population of the *R. tawarensis* was decreasing sharply during the last two decades (Muchlisin *et al*., 2011[b]).

It is noted that *R. tawarensis* and *P. tawarensis* are endemic species in Lake Laut Tawar. The *R. tawarensis* is one of the most important freshwater fishes in Central Aceh. In addition, the Gayonese (the origin ethnic group of Central Aceh) believe that *R. tawarensis* is a sacred fish in Lake Laut Tawar and they are very respect to this species. Moreover, the Genus *Tor* or known as *keureling* is also important species after *R. tawarensis* and *P. awarensis.* Keureling is one of the economically important freshwater fish and it has a very high price reached about USD 30 kg^{-1} at local market. Therefore, the fish has always been the first target for fishing by local fishermen using various fishing gears, including unfriendly and destructive fishing practices resulted in declining wild population drastically over the last ten years. The conservation program for the two endemic species (*R. tawarensis* and *P. tawarensis*) and other higher economic value species are crucially needed before we lose what we have.

Information of some biological and ecological aspects of depik have been reported by Muchlisin *et al.* (2010[a]; 2010[b]; 2011[a]; 2011[b]). Moreover, Muchlisin *et al.* (2010[a]) reported that *R. tawarensis* migrates to small and short tributaries around the lake during the rainy season on March, September and December for spawning activities. Unfortunately, the local fishermen put up barriers along the river to trap (*dedesan*) the migrating *R. tawarensis* during spawning. This fishing technique is a probable cause of the decline of the *R. tawarensis* population in Laut Tawar Lake as many mature brood fish were caught and killed before they could spawn, depleting future generations. Another likely cause of population decline is deforestation around the lake. Deforestation increases siltation and sedimentation into adjacent bodies of water and can alter water flow regimes possibly leading up to the drying up of several small tributaries around the lake.

Conclusions

A total of 114 species of freshwater fishes were documented during the survey, of which 84 species were true freshwater fishes and the rest of the species were estuary fishes. Among the freshwater fishes about 40 are utilized for consumption, of these, 14 species were of high economic value while at least 21 species displayed potential for the ornamental fishes. In addition, based on evaluation of economic values and its popularity, we conclude that among the higher economic value fishes the *Tor soro, T. tambra, T. tambroides, A. bicolor bicolor, C. striata, C. lucius, C. batrachus, C. teijsmanni, C. niefhofii, Neolissochilus, R. tawarensis, P. tawarensis* should be categorized as important species for aquaculture.

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